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NP10 8QQ

REC'D 15 AUG 2003
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THE PATENT OFFICE
27 JUN 2002
NEWPORT

27JUN02 E729010-1 C56755
P01/7700 0.00-0214841.9

1/77

Request for grant of a patent

(See the notes on the back of this form. You can also get an explanatory leaflet from the Patent Office to help you fill in this form)

The Patent Office

Cardiff Road
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South Wales
NP10 8QQ

1. Your reference

2. Patent application number *(The Patent Office will fill in this part)* 0214841.9 27 JUN 2002

3. Full name, address and postcode of the or of each applicant *(underline all surnames)*

Zia Shlaimoun
of 21 Glebelands Avenue, South Woodford, London E18 2AB

Patents ADP number *(if you know it)* 8044140002

If the applicant is a corporate body, give the country/state of its incorporation

4. Title of the invention

Voltage Capping Device

5. Name of your agent *(if you have one)*

"Address for service" in the United Kingdom to which all correspondence should be sent *(including the postcode)*

Mr Z Shlaimoun - as above

Patents ADP number *(if you know it)*

6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and *(if you know it)* the or each application number

Country	Priority application number *(if you know it)*	Date of filing *(day / month / year)*
—		

7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application	Date of filing *(day / month / year)*
—	

8. Is a statement of inventorship and of right to grant of a patent required in support of this request? *(Answer 'Yes' if:* No

a) any applicant named in part 3 is not an inventor, or
b) there is an inventor who is not named as an applicant, or
c) any named applicant is a corporate body.
See note (d))

9. Enter the number of sheets for any of the following items you are filing with this form. Do not count copies of the same document

Continuation sheets of this form	
Description	5 4
Claim(s)	—
Abstract	—
Drawing(s)	2 + 2 RM

10. If you are also filing any of the following, state how many against each item.

Priority documents	
Translations of priority documents	
Statement of inventorship and right to grant of a patent *(Patents Form 7/77)*	
Request for preliminary examination and search *(Patents Form 9/77)*	
Request for substantive examination *(Patents Form 10/77)*	
Any other documents *(please specify)*	

11. I/We request the grant of a patent on the basis of this application.

Signature [signature] Date 26/6/02

12. Name and daytime telephone number of person to contact in the United Kingdom ZIASHAMOUN 07971787161

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Notes

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b) Write your answers in capital letters using black ink or you may type them.

c) If there is not enough space for all the relevant details on any part of this form, please continue on a separate sheet of paper and write "see continuation sheet" in the relevant part(s). Any continuation sheet should be attached to this form.

d) If you have answered 'Yes' Patents Form 7/77 will need to be filed.

e) Once you have filled in the form you must remember to sign and date it.

f) For details of the fee and ways to pay please contact the Patent Office.

Title: Voltage Capping Device

The present invention relates to a Voltage Capping Device for electrical equipment.

Many sites such as commercial premises, e.g. shops and offices, operate a range of electrical equipment such as fridges, cool-rooms, freezers, and computer equipment. Most of this equipment is rated to operate at 230V AC.

The electricity supply to such sites can vary between 200V AC and 250V AC, and in many instances the electricity is supplied at the higher of these two extremes.

If the electricity is supplied at a voltage higher than the rated voltage of an item of electrical equipment, two problems can occur. Firstly excess electricity is consumed resulting in increased costs. Secondly additional heat and losses are generated in the equipment, which can lead to premature equipment failure.

The invention seeks to provide a solution to this problem, and which will also help to prevent damage to electrical equipment due to excess voltage surges.

According to the present invention there is provided a Voltage Capping Device for connection between an AC electrical supply having one or more phases and at least one item of electrical equipment comprising:

a) An electronic switch for each phase of AC electrical supply, in use between the AC voltage supply and the equipment, to vary the time a voltage is delivered for each half cycle of the AC mains supply,

b) Output voltage measuring, means to measure the voltage between the switch output and the equipment,

c) Comparator, means to compare the voltage as measured by the output measuring means with a predetermined voltage value, and

d) Control, means to control the electronic switch, as dependent on signals received from output measuring means and comparator means, to ensure the voltage delivered to the equipment is substantially equal to said predetermined voltage value.

Preferably the electronic switch consists of a thyristor module that varies the time a voltage is delivered by delaying the onset of each rise in voltage for each half cycle. Preferably the thyristor module is a pair of thyristors placed back to back.

Preferably a bypass switch is provided across the or each electronic switch.

Preferably the capping device is powered from the AC electrical supply.

Preferably a display is provided to display set-up parameters and operating information.

Preferably means are provided to vary the predetermined voltage value.

An embodiment of the invention will now be described with reference to the accompanying drawings in which:
Figure 1 shows a circuit diagram,
Figure 2 shows a thyristor module formed from two back to back thyristors, and
Figure 3 shows a graph on one complete AC cycle as altered by the invention.

Referring to Figure 1 there is shown a circuit diagram of a Voltage Capping Device 1. Voltage capping device 1 is connected between an AC electrical supply having three phases P1, P2, P3 and an item of three phase electrical equipment represented by L1, L2, L3.

Device 1 has three electronic switches THY1, THY2, THY3 between each phase P1, P2, P3 of the electrical supply and the equipment L1, L2, L3 to vary the time a voltage is delivered for each half cycle of the AC mains supply. Switches THY1, THY2, THY3 are each a thyristor module formed by a pair of thyristors placed back to back as shown in Figure 2.

Each thyristor module varies the time a voltage is delivered by delaying the onset of each rise in voltage for each half cycle as described below. Switches THY1, THY2, THY3 can be bypassed using bypass switches S1, S2, S3 controlled either by means of a master bypass switch SW1 or automatically in the event of a fault, operating a bypass contactor control circuit 2.

An output voltage sensor 3 provides a measuring means to measure the voltage between each switch output THY1, THY2, THY3 and the equipment L1, L2, L3.

A comparator means is provided by a comparator circuit 4 to compare the voltage as measured by the output voltage sensor with a predetermined voltage value as varied and set by voltage output set-points V1, V2, V3.

A thyristor control means 5 is provided to control the switches THY1, THY2, THY3, as dependent on signals received from output voltage sensor 3 and comparator circuit 4, to ensure the voltage delivered to the equipment L1, L2, L3 is substantially equal to the predetermined voltage value as varied and set by voltage output set-points V1, V2, V3.

A display 6 is provided to display set-up parameters and operating information.

The capping device 1 is powered from a transformer unit 7 fed from the AC electrical supply P2, P3.

Figure 3 is a graph showing voltage over time. Line A illustrates the waveform of a normal single phase of AC supply (e.g. from P1). Each thyristor switch THY1, THY2, THY3 is controlled to vary the time a voltage is delivered by delaying the onset of each rise in voltage for each half cycle, as shown by line B so as to reduce the waveform amplitude resulting in a lowering of the effective RMS voltage. Increasing the delay causes the waveform amplitude (and hence RMS voltage) to decrease and reducing the delay causes the waveform amplitude (and hence RMS voltage) to increase.

The capping device 1 thus uses its voltage sensor 3 to senses the output voltage of the switches THY1, THY2, THY3, and this voltage value is then adjusted up or down, by delaying the conduction through thyristors THY1, THY2, THY3, depending on whether the voltage value is below or above the predetermined value, as varied and set by voltage output set-points V1, V2, V3.

It will thus be seen that the capping device of the invention can be used to maintain a voltage supply at a constant level at or below a predetermined value.

In practice, the predetermined value can be set at the rated voltage of electrical equipment L1, L2, L3 so that excess electricity is not consumed resulting in increased costs, and so that additional heat and losses are not generated which can lead to premature equipment failure. This also helps to prevent damage to electrical equipment due to excess voltage surges.

The invention may take a form different to that specifically described above. For example instead of one item of three phase electrical equipment L1, L2, L3, the L1, L2, L3 could represent more than one item of three phase equipment or three separate single phase electrical circuits or a combination. Also the capping device may be used with single-phase electricity, in which case the capping device would have only one electronic switch to control one or more items of single- phase electrical equipment.

Further modifications will be apparent to those skilled in the art without departing from the scope of the present invention.

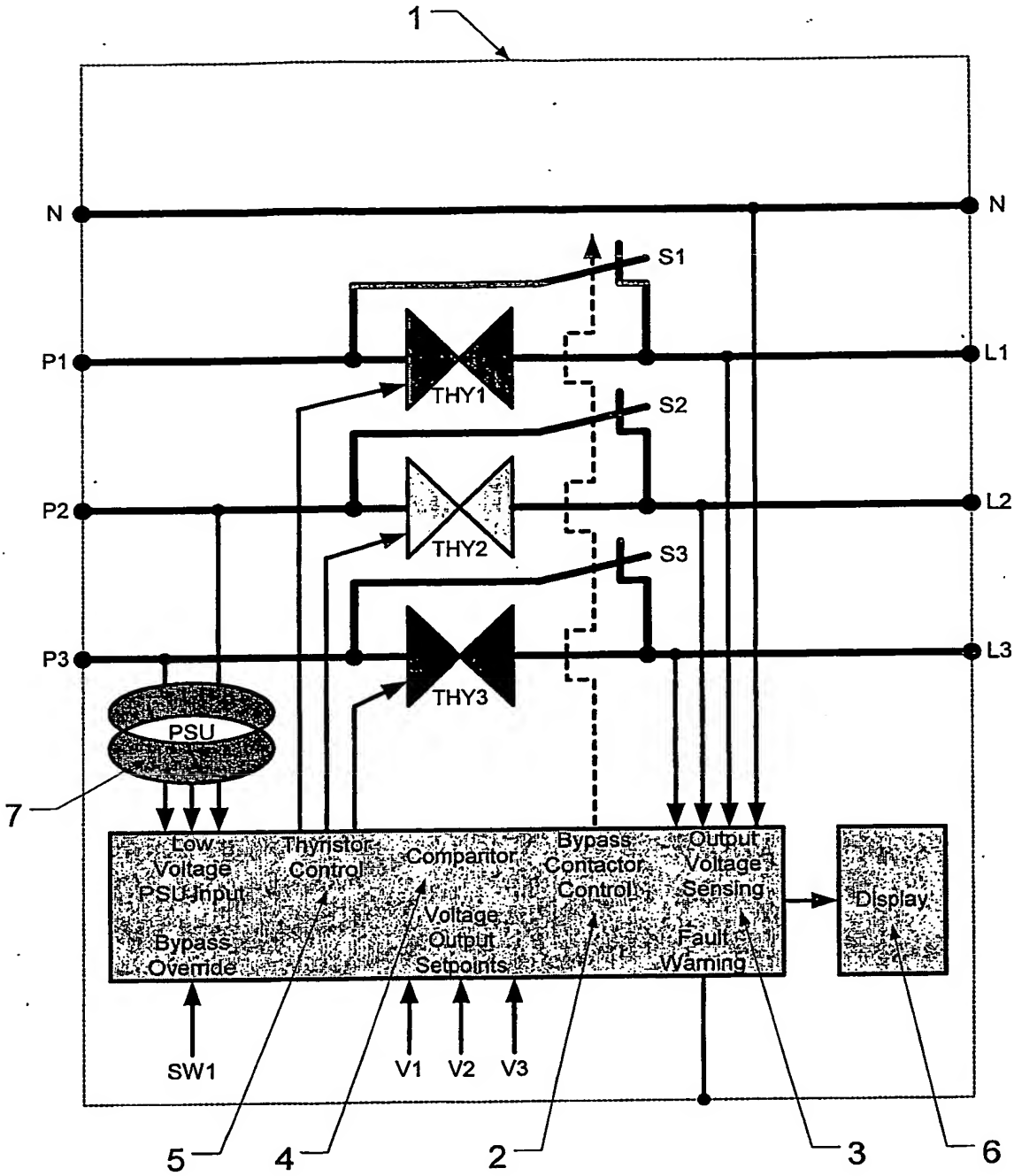
1
N
N
S1
P1
L1
THY1
S2
P2
L2
THY2
S3
P3
L3
THY3
PSU
7
Low Voltage PSU Input
Thyristor Control
Comparitor
Bypass Contactor Control
Output Voltage Sensing
Display
Bypass Override
Voltage Output Setpoints
Fault Warning
SW1
V1
V2
V3
5
4
2
3
6

FIGURE 1

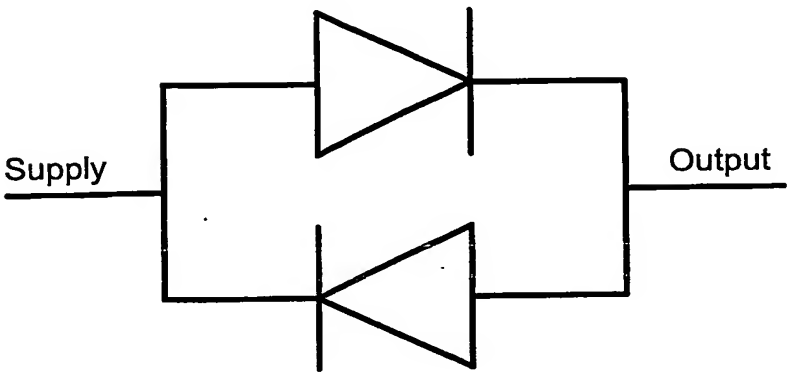

FIGURE 2

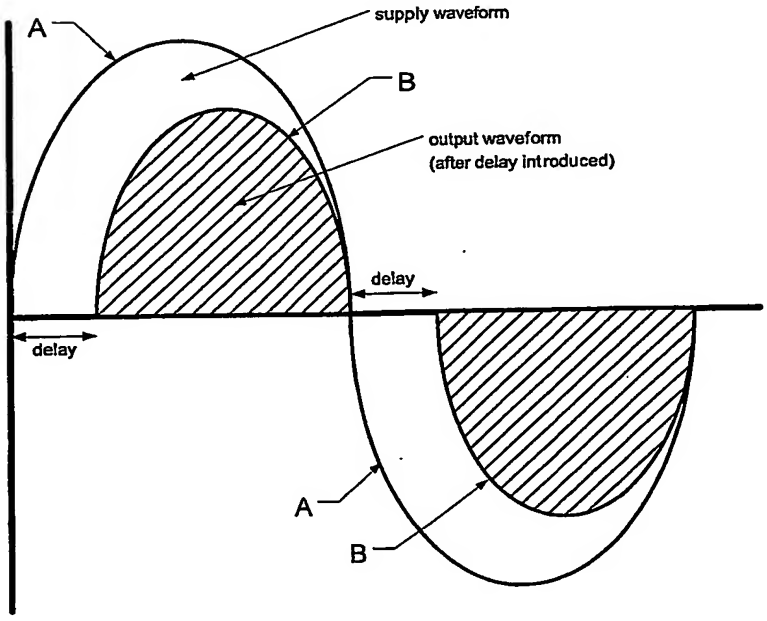

FIGURE 3